not occur too soon for complications, because the majority survived for over two weeks.

The clinical records in our Groups 2, 3, and 4, where pus was found in the mastoid after death, do not reveal that diarrhoea and vomiting were a feature of the illness, as might be expected if the association of mastoiditis and diarrhoea were that of cause and effect. Indeed, while the "parenteral" infection is well recognized as often being associated with vomiting and diarrhoea in infants, "gastro-enteritis" is not a common associate with, say, a pneumococcal empyema or a staphylococcal osteomyelitis, even when undrained. Why should the same infection in the mastoid cause such profound results?

The shorter, wider, and more patent Eustachian tube is often evoked to explain how milk-infected mucus, etc., can find its way to the middle ear. It seems to us that the reverse holds—namely, that "pent-up" pus is less likely to be present in the middle ear of infants than in older patients, because some drainage can take place through the tube into the pharynx. In fact, this is possibly one of the reasons why classical drum signs are often absent in infants with acute otitis media.

Infants have fairly well developed antral, ethmoid, and sphenoidal sinuses. While clinically recognizable "sinusitis" is not common in infants, it would seem logical to suspect these also as being the seat of "pent-up" infection. Ebbs (1937) has shown that pus can be found in one or more sinuses at necropsy in a by no means negligible number of patients. In the age group he investigated the findings were positive in 30.6% of 496 cases examined. We agree with Findlay (1932) that the climax of the "focal sepsis" theory was surely reached when Odeneal (1928) stated that the nasal accessory sinuses are infected in 50% of cases of gastro-enteritis, and that if myringotomy and mastoidectomy do not cause improvement in the infant's condition the sinuses should be opened and drained!

The diversity of organisms found in our cases and in other investigations makes it difficult to believe that such a constant syndrome as infantile diarrhoea and vomiting can be the result of such infection. Finally, the highly infectious nature and the mode of spread of gastro-enteritis in infants' wards in hospital form, we think, one of the strongest points against latent mastoid infection being the key to the aetiology of this condition.

Summary

In a series of 120 necropsies in infants and young children pus was found in the mastoid cavities of 71.

Though the highest incidence was in patients with a clinical history of "diarrhoea and vomiting," it was found almost as often in a wide variety of conditions.

Clinical, post-mortem, and bacteriological findings suggest that so-called "latent mastoiditis" is not an aetiological factor in the diarrhoea-and-vomiting symptom-complex.

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The Club for Research on Ageing has received from Lord Nuffield a donation of £3,000, which will enable Dr. V. Korenchevsky to continue his gerontological investigations for a period of three years. Clinical trials of the effects of vitamins on aged persons at the Tooting Bec Hospital will be finished at the end of this year. These were rendered possible during the last two years by substantial grants from Lord Nuffield and the Nuffield Foundation. The Club expresses its heartfelt thanks for these benefactions, and is also very much indebted to the London County Council for most valuable co-operation.

SECONDARY ABDOMINAL PREGNANCY

BY

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Secondary abdominal pregnancy is a well-recognized but uncommon complication of pregnancy, and numerous cases have been described in the past. The case here recorded is of interest in view of the complications which had arisen by the time the patient was brought for treatment.

Case Report

On April 22, 1944, a Kanuri woman aged about 30 was brought to the African Hospital, Maiduguri. She complained of twelve months' amenorrhoea, increasing abdominal swelling for the same period of time, and for the last month a purulent discharge from the umbilicus. She did not complain of pain, but on questioning stated that she had suffered from an attack of abdominal pain three months previously, at the approximate time when her pregnancy should have terminated. She did not admit to having had any pain at an earlier period of the pregnancy. On examination the woman was seen to be extremely ill and considerably dehydrated. Her temperature was 99° F. and pulse rate 120 a minute. There was a swelling in the abdomen which appeared to be a pregnant uterus up to the level of 3 in. below the ensiform cartilage. There was a purulent discharge from the umbilicus, from which a portion of a foetal foot was protruding. Traction on this produced the whole foot as far as the ankle-joint. The skin of the foot was somewhat macerated. Over the whole of the left side of the abdomen were well-marked gas crepitations, which extended to well beyond the nipple line. There was a copious and offensive vaginal discharge.

The woman was taken to the theatre immediately, and under light chloroform anaesthesia the small opening in the umbilicus was enlarged upwards and downwards for about 2½ in. each way. This revealed a large cavity full of pus and lined with thick granulation tissue. A macerated foetus was extracted and the cavity washed out with saline, hydrogen peroxide, and finally eusol. There was no umbilical cord attached to the foetus or to any part of the gestation sac, and the foetal umbilicus was closed. The gestation sac was not within the uterus, and there was no opening out of the sac other than that through the umbilicus, which had been enlarged at the operation. The anterior wall of the gestation sac consisted of the anterior abdominal muscles and skin only. The wound was loosely sutured by silk-worm-gut stitches through all the layers, and a large drainage-tube was left in the cavity.

The patient was returned to bed and given anti-shock treatment. Rectal saline was administered several times in the first 24 hours and was retained well. To counteract the general infection and the gas infection of the abdominal wall 20 c.cm. of 10% soluseptasine was given immediately and 10 g. of sulphanilamide daily by mouth for the first two days. Antitetanus serum, 3,000 units, was given on admission, but no anti-gas-gangrene serum was available. The sulphanilamide was reduced to 5 g. daily on the third and fourth days and then to 4 g. daily for a further four days. The cavity was washed out at first thrice daily with hydrogen peroxide followed by eusol, and the vagina was douched twice daily with weak potassium permanganate. Recovery was far more satisfactory than could reasonably have been expected. The toxæmia diminished rapidly and the gas crepitations had disappeared within 48 hours. The tube was removed on the fifth day and the stitches on the eighth. By this time the wound was being syringed out once daily and the discharge had decreased considerably. The vaginal discharge had almost ceased. During this week routine examinations of the blood and faeces resulted as follows. Blood: no malaria parasites seen; haemoglobin 40%. Faeces: ova of *Ancylostoma duodenale* and live *Trichomonas intestinalis* were both present in considerable numbers. Treatment of the anaemia was instituted immediately, and at a later date the ancylostome infection was treated successfully with oil of chenopodium.

Convalescence was naturally slow, for the patient had been very debilitated. On May 1 she developed a bed-sore over the sacrum which took six weeks to heal. The abdominal wound healed slowly and a sinus persisted which required to be laid open and packed with bipp. She was discharged from hospital on June 17, by which date the abdominal wound was healed. The haemoglobin was then 65%, and there was no evidence of hookworm infection.

Discussion

Secondary abdominal pregnancy—i.e., continuation of pregnancy within the abdominal cavity following rupture of a tubal pregnancy—is described as being of two varieties—intraperitoneal and intraligamentary, depending on whether the tube

ruptures into the peritoneal cavity or between the layers of the broad ligament. In the intraperitoneal variety the gestation sac is formed mainly by inflammatory tissue laid down on the outside of the amnion. In the intraligamentary variety, as the sac enlarges it displaces the peritoneum upwards and, if lying anteriorly, will strip the peritoneum from the anterior abdominal wall. The pregnancy may continue for a normal period of nine months, after which time a false labour occurs and the foetus dies. After the death of the foetus, if the sac remains sterile, the foetus will become inspissated and in the course of years be converted into a lithopaedion. Infection of the sac is apt to occur at any time from the bowel, uterus, or vagina. In such cases fistulae may form between the sac and one of these other structures. Infection from the bowel is probably more likely to arise in the intraperitoneal variety, for in this type the bowel is adherent to the sac wall.

In the above case the pregnancy was probably of the intraligamentary variety. Furthermore, it is probable that the infection had come from the vagina; for, although no fistulous opening was seen, it is likely that a small opening did exist. It is almost certain that at the time of the false labour some vaginal interference had been attempted by the patient's friends and relations. Any such interference would have taken place under the most septic conditions. The presence of a vaginal fistula would account for the profuse and offensive vaginal discharge, which cleared up at about the same rate as the discharge from the gestation sac.

Summary

A case of secondary abdominal pregnancy, complicated by infection of the sac and rupture through the umbilicus, is described.

A short reference is made to the types of intra-abdominal pregnancy and to the ways in which these may terminate.

The case described is classified as the intraligamentary variety, and the probable source of infection is indicated.

Medical Memoranda

Gas Gangrene after Amputation under Refrigeration Anaesthesia: A Warning

Many surgeons are adopting the freezing method to anaesthetize a limb before amputation. There is no doubt that in certain cases, notably diabetic gangrene, this has distinct advantages. The following case shows that unsuspected danger may lurk even here.

On July 23, 1944, I performed an amputation of the right leg through the middle third for spreading diabetic gangrene of the second and third toes. The patient was a man aged 75, in good general condition. The operation was performed with routine pre- and post-operative refrigeration technique, and first of all went well. Forty-eight hours afterwards, however, he became very ill, and on examination presented the clinical picture of a well-established gas-gangrene infection of the stump. The condition appeared to be beyond surgical scope, and the patient died 12 hours later in spite of the administration of large doses of anti-gas-gangrene serum. Cultures of the muscles during life showed *Cl. welchii* with typical stormy clot formation. In seeking the source of infection we had the ice examined. A bacillus showing the cultural and biochemical features of *Cl. welchii* was isolated. Subsequent examination, on different days, of two further specimens of ice, taken from the centre of a new block immediately on delivery with strict aseptic precautions, gave the same result.

Numerous amputations had previously been done at the hospital, using ice from the same source, with no untoward result. It thus seems that any surgeon proposing to use the method should first make sure the ice supplied is free from pathogenic bacteria—especially spore-bearing varieties. Most of the ordinary pyogenic bacteria probably succumb to the usual skin-cleansing on the theatre table. Ice may be contaminated from its container or during transit from the factory (although better than in Continental cities, there are still a few open ice-carts about, and still a few horses to enrich the dust of London streets); but in this case the contamination has been proved to be in the ice. The matter is being taken up by the makers and will shortly be put right, no doubt.

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Reviews

SURVEY OF BIOCHEMISTRY

Annual Review of Biochemistry. Vol. XIII. Editor, James Murray Luck; Associate Editor, James H. C. Smith. (Pp. 795. 31s. 6d.) California: Stanford University Press; London: H. K. Lewis and Co.

With 90 more pages than the previous volume (reviewed in the *Journal* on July 22, 1944) the new one again presents certain now valued and expected features, along with the pleasant air of novelty imparted by certain of the more specialized chapters. Anglo-American collaboration is, as before, in evidence: three of the chapters are by British experts, one by a Canadian, one by a Puerto Rican scientist, and the others by authors in the United States. The editors have continued their established practice of changing almost all the contributors, even for those subjects that are repeated year by year—a practice that editors of annual reports and reviews elsewhere might bear in mind. Thus D. E. Green and P. K. Stumpf take over biological oxidations and reductions from F. Lipmann; W. Z. Hassid the chemistry of carbohydrates from H. S. Isbell; H. Neurath and J. P. Greenstein the chemistry of proteins and amino acids from L. F. Hewitt, R. A. Kekwick, and A. S. McFarlane; E. A. Evans jun. carbohydrate metabolism from H. J. Deuel jun.; R. H. Barnes and E. M. MacKay fat metabolism from G. O. Burr and R. H. Barnes; C. P. Berg the metabolism of proteins and amino acids from H. Borsook and J. W. Dubnoff; J. C. Keresztesy the water-soluble vitamins from R. J. Williams; W. C. Russell the fat-soluble vitamins from K. Hickman; W. H. Sebrell nutrition from C. S. Lanford and H. C. Sherman; F. J. Richards the mineral nutrition of plants from D. I. Arnon. For a reason that close examination of both texts has failed to reveal, the chemistry of the lipids, discussed last year by S. J. Thannhauser and G. Schmidt, is this year replaced by the chemistry of the lipids from the pen of J. B. Brown. If the two terms are interchangeable, one is superfluous; if they are to be differentiated, perhaps the editorial board would decide and declare how. This year's article, it should, however, be said, is as interesting as last year's. Again, R. A. McCance and E. M. Widdowson have chosen in the present volume to write on "Mineral Metabolism," whereas in Volume XII L. A. Maynard and J. K. Loosli took the same terms of reference under "Mineral Nutrition." "The Chemistry and Metabolism of the Compounds of Phosphorus" is this year contributed by A. A. Green and S. P. Colowick, in place of last year's analogous review of sulphur compounds by J. C. Andrews.

So much for the staple foods: there are as well a number of attractive side-dishes. T. Mann and C. Lutwak-Mann on non-oxidative enzymes; H. S. Loring on nucleic acids, purines, and pyrimidines; D. Burk and R. J. Winzler on the biochemistry of malignant tissue; E. L. Tatum on the biochemistry of fungi; D. Glick on histochemistry—all these provide scientific titillation for those palates with a taste for the theoretical or laboratory side of biochemistry, as does the chapter on steroids by F. C. Koch. (Incidentally, it is good to see this term, first proposed by the British scientists R. K. Callow and F. G. Young, now generally adopted.) Others more concerned with the possibilities of therapeutic application will turn with appetite to "The Alkaloids" by R. H. F. Manske; "Synthetic Drugs—Antispasmodics" by F. F. Blicke; "The Chemistry of the Hormones" by H. Jensen: while the more botanically or agriculturally minded will find satisfaction in C. F. Huffman's and C. W. Duncan's chapter on deficiencies of farm animals, in "Chloroplast Pigments" by H. H. Strain, "Growth-regulating Substances in Plants" by J. van Overbeek, and "Photoperiodism in Plants" by K. C. Hamner.

A feature of interest about the authors of this volume is that they are drawn from all types of scientific institutions—Governmental, academic, and industrial. Naturally the academic workers predominate, even when allowance is made for the fact that the staffs at many State colleges in the United States are, strictly speaking, Governmental employees. It is, however, worthy of note that five of the experts (out of